UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604

DATE: MAR 19 2013

SUBJECT: Plant Inspection- Alcoa, Lafayette, IN

FROM: Kushal Som, Environmental Engineer
Air Enforcement and Compliance Assurance Section
(IL/IN)

THRU: Nathan Frank, Chief
Air Enforcement and Compliance Assurance Section
(IL/IN)

TO: File

Date of Inspection: June 21, 2012

Attendees:

Gregory D. Goga, Senior Environmental Professional, Alcoa Forgings and Extrusions

Gene R. Kroeschen, Senior Staff Mechanical Engineer, Alcoa Global Engineered Products

Kushal Som, Environmental Engineer, U.S. EPA

Robert Henry, Environmental Engineer, IDEM

Purpose of Inspection: The U.S. EPA conducted an inspection to evaluate compliance with the Clean Air Act. The facility is in the process of constructing a Lithium Aluminum process.

Company Description and Background

Plant Location: 3131 East Main Street
Lafayette, Indiana 47905

Phone Number: (765) 771-3191

Primary Contact: **Gregory D. Goga**, Senior Environmental Professional, Alcoa Forgings and Extrusions

List of Major Applicable Rules

40 CFR Part 70 - Title V (326 IAC 2-7)
40 CFR Part 63, Subpart RRR - Secondary Aluminum NESHAP
326 IAC 5-1 (Opacity)
326 IAC 2-2 - PSD Minor Limits
326 IAC 6-3-2 - Particulate Limits
326 IAC 8-1-2 - VOC Limits

Opening Conference (Plant Description):

Alcoa is a secondary aluminum plant that charges scrap and pig block aluminum into melting furnaces. The molten aluminum is cast into cylindrical billets, and shaped into various products for the aerospace and automotive industries.

Ingot Building

Aluminum scrap or pig blocks arrive at the Ingot Building at the west side of the facility. The company contends that the aluminum scrap is considered "clean scrap". The aluminum blocks are stored in a drying room that utilizes an electric heater at approximately 150 degrees Fahrenheit. The aluminum scrap is stored in a drying oven that is heated by natural gas to about 150 degrees Fahrenheit.

Scrap Drying Oven Charging Side
G:/Air Enforcement & Compliance/IL and IN/ksom/ALCOA

The aluminum is then charged into one of five melting furnaces (Furnaces 2-2, 2-3, 2-4, 2-5 and 2-6) using an end-loader. Direct-fired natural gas burners, located along the side walls, melt the aluminum in each furnace hearth.

Melting Furnace Charging Side
G:/Air Enforcement & Compliance/IL and IN/ksom/ALCOA

Fluxes, such as fluoride or chlorine-based salts, are added to the molten bath to remove impurities, which float to the top of the molten metal as dross. The dross is skimmed off and shipped off-site. The flux is in a compressed form, similar in shape to a flower pot. In the past, the flux was added in a granular form, and thus caused significant particulate emissions.

After the molten aluminum achieves its proper chemistry, the furnaces are tilted away from the charging side (west side of furnaces) to pour the liquid metal into a trough.

These furnaces were converted from stationary furnaces (furnaces that did not tilt) to tilting-type furnaces

starting in the late 1980's to mid-1990's, as part of a productivity initiative. A Request for Authorization (RFA) was developed to internally justify the initiative, and a Post Project Review was developed to determine the impact of the initiative after it was completed and began operation.

The stationary furnaces were more dangerous, due to the need to open a tapping hole to allow the liquid metal to exit the furnace. The conversion to a tilting furnace also increased the production capability of each furnace. According to the Indiana Department of Environmental Management's review of the facility during their Title V permit renewal process, the aluminum melting furnaces were built at the following times:

26 MMBTU/hour Melting Furnace 2-2 (1994) at 6.0 tph
26 MMBTU/hour Melting Furnace 2-3 (1994) at 6.0 tph
36 MMBTU/hour Melting Furnace 2-2 (1991) at 9.58 tph
36 MMBTU/hour Melting Furnace 2-2 (1988) at 9.58 tph
36 MMBTU/hour Melting Furnace 2-2 (1995) at 9.58 tph

The liquid aluminum then runs down the trough to a degassing box (A622) which injects a mixture of argon and chlorine gas (chlorine gas makes up about 0.3% of the total gas injected). The gases are injected to reduce the amount of entrained hydrogen in the metal (hydrogen can cause holes in the final product).

Hydrogen gas spontaneously burns off at the top of the degassing box. It is unknown how much of the chlorine or hydrochloric acid is emitted from the box, and how much remains in the metal.

The metal then runs via another trough to enter into a Filter Bowl, which contains a ceramic filter made of a silica refractory product manufactured by Seely. The filter removes impurities from the molten metal.

After the filter bowl, the metal goes to the casting pit, where the aluminum metal enters into a series of cylindrical holes (from 2 to 9 depending upon the size of product) which are sized between 6 to 42 inches in diameter. The cylinders (billets) can be cast into lengths of up to 200 inches long.

A622 Filter Box Burning off Gas (Hydrogen and other gases)
G:/Air Enforcement & Compliance/IL and IN/ksom/ALCOA

After cooling (solidification), the billets are lifted vertically using a crane and loaded onto racks. The cylinders are then moved to the Lathe area where the Aluminum Oxide rust is mechanically removed.

Furnace 2-2 Casting Table
G:/Air Enforcement & Compliance/IL and IN/ksom/ALCOA

Pre-heat Bay

The cylinders are then moved to one of seven natural gas-fired ingot pre-heaters in the Preheat Bay, which are then cut to length using a saw. Approximately 2% of the cylinders have a bore hole added.

The cylinders, at this point, are either sent to the Extrusion 1 Building (smaller products), Extrusion 2 Building (larger products), or the Alcoa Cleveland, Ohio plant. Approximately 20% of the cylinders are shipped to Cleveland.

Extrusion I

The cylinders are then reheated in one of five press natural gas-fired reheat furnaces:

18 MMBTU/hour Reheat Furnace #5 built in 1975
16 MMBTU/hour Reheat Furnace #6 built in 1973
16 MMBTU/hour Reheat Furnace #2 built in 1987
16 MMBTU/hour Reheat Furnace #12 built in 1989
16 MMBTU/hour Reheat Furnace #8 built in 1992

After the cylinders are pushed through a hydraulic press die, they air cool on roller tables, and then sawed into specified lengths. Approximately 10% of the products are shipped to their Baltimore, Maryland facility. The remaining 90% go through additional finishing/stretching operations in the Extrusion I Building.

This includes:

14 MMBTU/hour natural gas-fired "Aging" Furnace #6 (1996)
Corrosion Inhibitors
Printer that prints "Lot Numbers" on each piece
Various Vertical and Reheat Furnaces

The products are then sent to the quench pits, which contain a mixture of glycol and water. Approximately 85% of these products ship off-site and the remaining 15% goes to the Tube Mill.

Extrusion 2/ Tube Mill/Die Shop/Shipping

These processes contain the following types of processes:

- Clear Coating Applicators
- Natural Gas Boilers
- Printing/Inking Operations
- Age & Tube Annealing Furnaces
- Reheat Furnaces
- Die Cleaning Caustic Exhaust System
- Draw Furnaces
- Hot Forging Operations

Plant Tour (Observations)

We conducted a plant tour, starting in the Ingot Building. The group observed the tapping side of the melting furnaces (the furnaces were not tapping at this time). We then observed the charging side of the melting furnaces (the furnaces were not being charged at this time). Molten metal was being heated with natural gas burners, and I observed no smoke or particulate emissions from the operation.

Closing Conference & Follow-up Investigation:

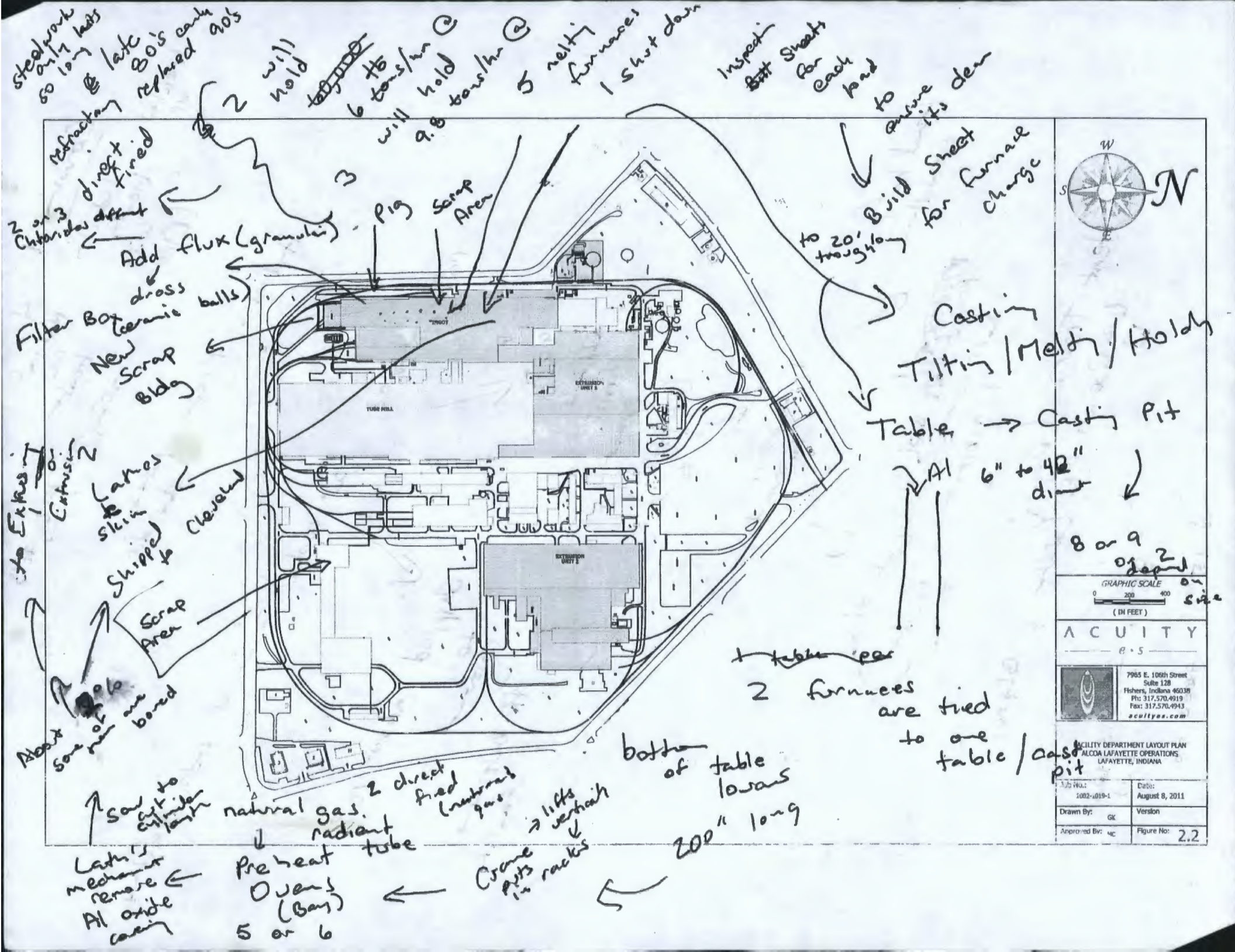
I told the company that a Section 114 letter may be forthcoming to gather additional information. The Section 114 letter will likely include the following items:

- Information on the conversion from the stationary melting furnaces to the tilting-type in the late 1980's to mid-1990's;
- Identification of various types of natural gas furnaces, and their increased utilization after changes to the facility;
- All documents related to nitrogen oxide, chlorine (Cl) and hydrochloric acid (HCl) emissions from the degassing boxes;
- All documents related to particulate matter (PM), HCl and chlorine (Cl) emissions from the skim cooling operations;
- VOC emissions (last 5 years) from the clear coating applicators (VOC content and coating usage), and dates of commenced construction for each applicator
- The purpose and history of the #34 tube age anneal furnace afterburner. What type of emissions is the afterburner controlling? Do they expect other afterburners to emit similar emissions?
- A description of the operation of the #10 lead pot furnace. Description of capture and control for the furnace. Provide all copies of all testing conducted related to lead emissions.
- RFA's and Post Project Reviews for each project

since 1985 that costs more than $100,000.

- VOC emissions (last 5 years) from the printing and inking operations (VOC content and coating usage), and dates of commenced construction for each applicator;

- Permit application and all engineering studies related to the Aluminum-Lithium Alloy Cast House Project


steel roof on 7 bents 60 long & late 80's early replaced 90's
refractory
2 will hold
6 tons/hr @
will hold 9.8 tons/hr @
5 melting furnaces 1 shut down
Inspect Batt Sheets for each load
to ensure it's dem
direct fired
3
Pig
Scrap Area
Bill Sheet for furnace charge
to 20' trough long
Add flux (granular)
Add dross
Filter Box (ceramic balls)
New Scrap Bldg
Casting
Tilting / Melting / Holding
Table → Casting Pit
Al 6" to 42" dia
8 or 9 deep
GRAPHIC SCALE
0 200 400
(IN FEET)
ACUITY
7965 E. 106th Street
Suite 128
Fishers, Indiana 46038
Ph: 317.570.4919
Fax: 317.570.4943
acuityes.com
FACILITY DEPARTMENT LAYOUT PLAN
ALCOA LAFAYETTE OPERATIONS
LAFAYETTE, INDIANA
Job No.: 1002-1019-1
Date: August 8, 2011
Drawn By: GK
Version
Approved By: MC
Figure No: 2.2
Laminos to slitting
Shipped to Cleveland
Scrap Area
Saw to cut billet length
natural gas. radiant tube
2 direct fired (natural gas)
lifts vertical
bottom of table lowers
200" long
Crane puts in racks
Lathe machine remove Al oxide coating
Preheat Ovens (Bay) 5 or 6
2 furnaces are tied to one table / casting pit

Extrusion 1 4 Natural Gas Heaters #2, #11 #12, #13

Heated Up

Induction Heating Coils (Electric)

Hydraulic Press pushes thru die

(air cools) = Sawed into lengths

roller tables

Shipped about 10% to customer Ft. Baltimore facility

90% additional finish operations (stretching)

Ultrasonic Instruments

Hand held stencilling

Lot #s (Printed)

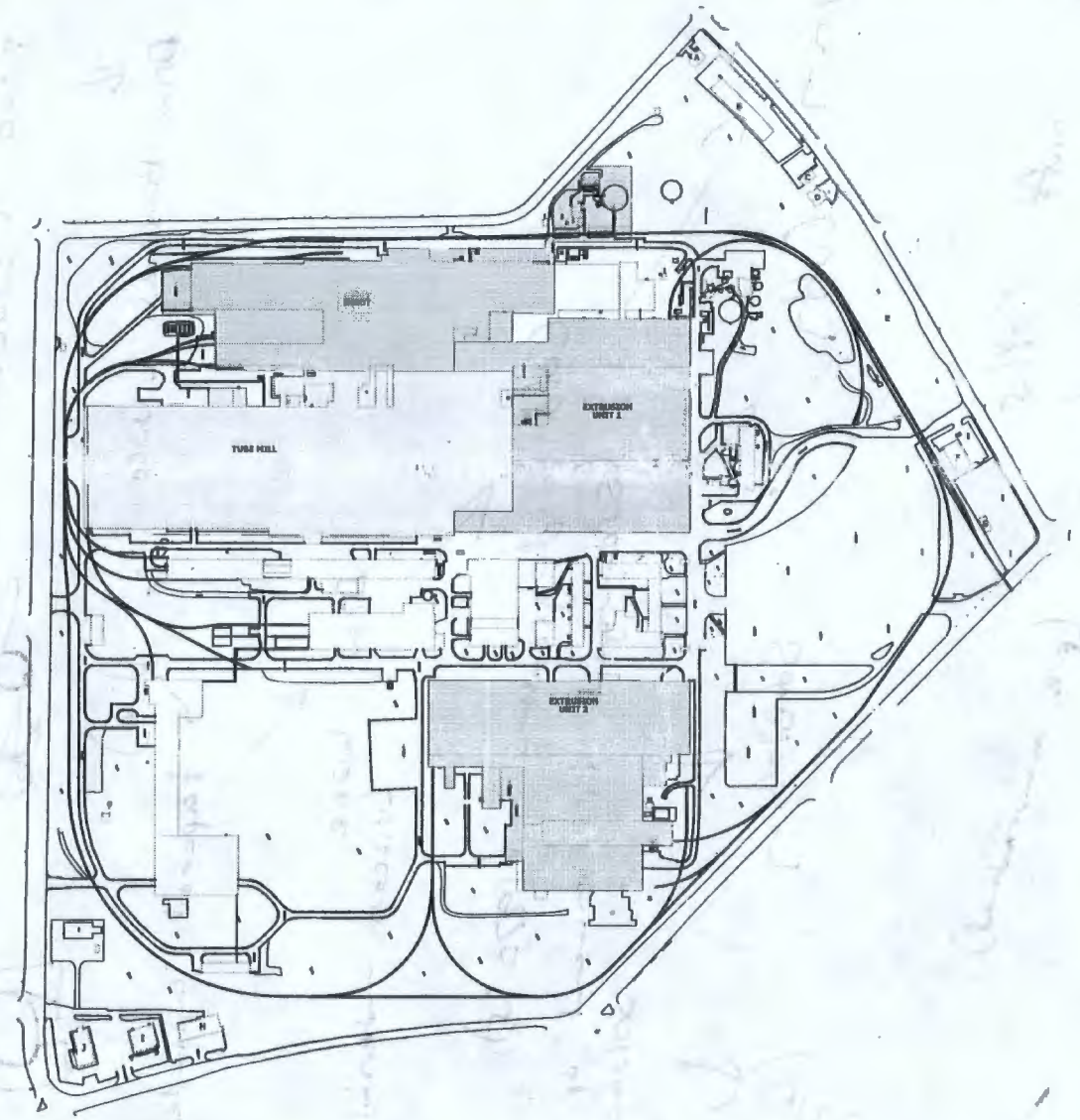
Protective coat. sol Corrosion Inhibitor

Heat Treats (Aging)

Quench Pits (Water & Glycol)

85% ships out

15% goes to



W
S
N
E

GRAPHIC SCALE
0 200 400
(IN FEET)

ACUITY
e·s

7965 E. 106th Street
Suite 128
Fishers, Indiana 46038
Ph: 317.570.4919
Fax: 317.570.4943
acuityes.com

FACILITY DEPARTMENT LAYOUT PLAN
ALCOA LAFAYETTE OPERATIONS
LAFAYETTE, INDIANA

Job No.: 1002-1019-1	Date: August 8, 2011
Drawn By: GK	Version
Approved By: MC	Figure No: 2.2

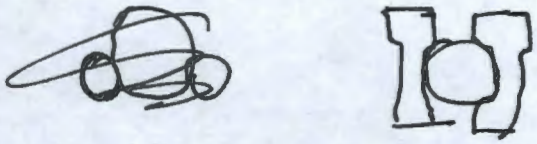
Extrusion → Mills (15%) → round pieces

Tube Mill

Heat Treating (Gas Fired annealing)

↓

tube reducer



↓

Draw Benches (uses a die)

↘ tapered cylinder

↓

Draw Lube (viscous material

↓

Cold degreasers (1970's)
(submerged in mineral spirits solvent)

↓ ↓ ↓ ↓

Roll Forming | Cutting | Stretching | Heat Treating

↓

Drive Shaft Cells
(filled foam Rubber (pre manufactured) and cord board

↓

Sound Deadening

↓

Heat Treating

↓

Inspection and Shipping